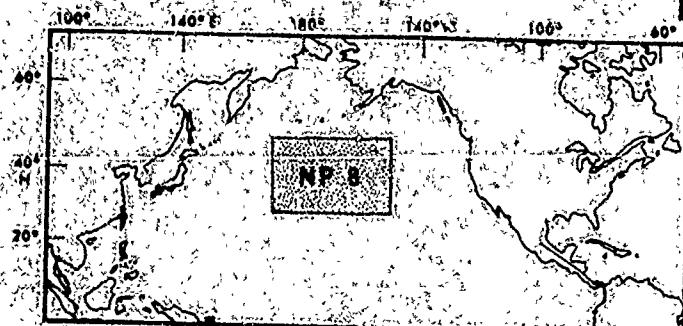


NAVAL OCEANOGRAPHIC OFFICE

SURFACE CURRE

NORTH CENTRAL NORTH PACIFIC

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JULY 1977



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DATA FILE COPY

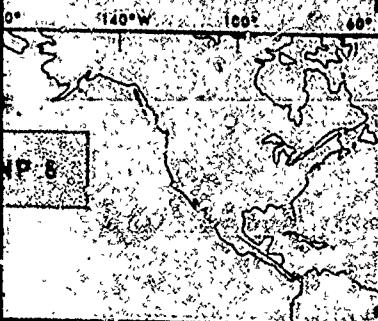
DEPARTMENT OF THE NAVY
WASHINGTON, D.C. 20373

GRAPHIC OFFICE SPECIAL PUBLICATION 1402 NP 8

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ABSTRACT

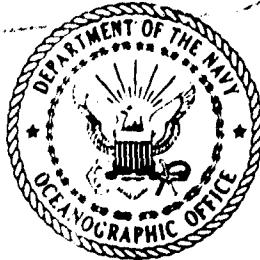
THIS ATLAS, AND THE SERIES OF WHICH IT IS A PART, IS COMPUTER GENERATED AND AUTOMATICALLY PLOTTED. IT MAKES AVAILABLE TO THE USER THE MOST RECENT SURFACE CURRENT DATA COLLECTED AND WILL BE UPDATED WHENEVER SUFFICIENT AMOUNTS OF DATA ARE ADDED TO THE DATA FILE. THIS AND THE OTHER ATLASES ARE BASED ON A VAST QUANTITY OF DATA AS COMPARED TO THE PREVIOUS MANUALLY-COMPILED EDITIONS PRINTED IN THE MID-THIRTIES.

THE SURFACE CURRENT INFORMATION IS BASED MAINLY ON SHIP DRIFT, WHICH IS THE DIFFERENCE BETWEEN THE DEAD RECKONING POSITION AND THE POSITION DETERMINED BY ANY TYPE OF NAVIGATIONAL FIX. THIS DIFFERENCE DESCRIBES THE DIRECTION AND SPEED OF THE CURRENT.

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(9) Special publication.



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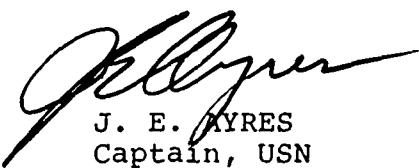
Messrs. Raymond J. Beauchesne* and William E. Boisvert
made major contributions to this atlas.

*Mr. Beauchesne presently is employed by the Bureau of
Naval Personnel.

FOREWORD

THIS ATLAS, ONE IN A SERIES OF 43 REGIONAL SURFACE CURRENT ATLASES, IS PRODUCED TO FULFILL A NEED OF NAVY PLANNING STAFFS AND THE SCIENTIFIC AND INDUSTRIAL COMMUNITIES FOR THE LATEST AVAILABLE OCEAN SURFACE CURRENT DATA. THESE ATLASES ADD TO THE WEALTH OF NAUTICAL INFORMATION UPON WHICH OPERATIONAL PLANNING, NAVIGATIONAL SAFETY, AND SHIPPING ECONOMY DEPEND. RAPID PRODUCTION AND WIDE DISSEMINATION OF THIS ATLAS ARE MADE POSSIBLE BY THE LATEST COMPUTER TECHNIQUES.

THE CONSTANT IMPROVEMENT IN THE QUALITY OF SURFACE CURRENT DATA RECEIVED OVER THE YEARS IS MADE POSSIBLE LARGELY BY THE MORE THOROUGH REPORTS OF VOLUNTARY OBSERVERS IN RECENT YEARS. THE DEFENSE MAPPING AGENCY, THE OCEANOGRAPHIC OFFICE, AND THE USER OF THE ATLASES RELY ON THE PERSONAL OBSERVATIONS OF THE MAN WHO HAS "BEEN THERE." MARINERS, IN REPORTING THEIR OBSERVATIONS, RENDER A SERVICE NOT ONLY TO THEMSELVES BUT ALSO TO ALL "WHO GO DOWN TO THE SEA IN SHIPS." WITH THE ADVENT OF NUCLEAR POWER, ELECTRONIC NAVIGATION AIDS, AND 300,000-TON SHIPS, UP-TO-DATE, RAPIDLY DISSEMINATED ENVIRONMENTAL AND NAVIGATIONAL INFORMATION HAS BECOME INCREASINGLY IMPORTANT.



J. E. AYRES
Captain, USN
Commander

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SURFACE CURRENT ATLASES

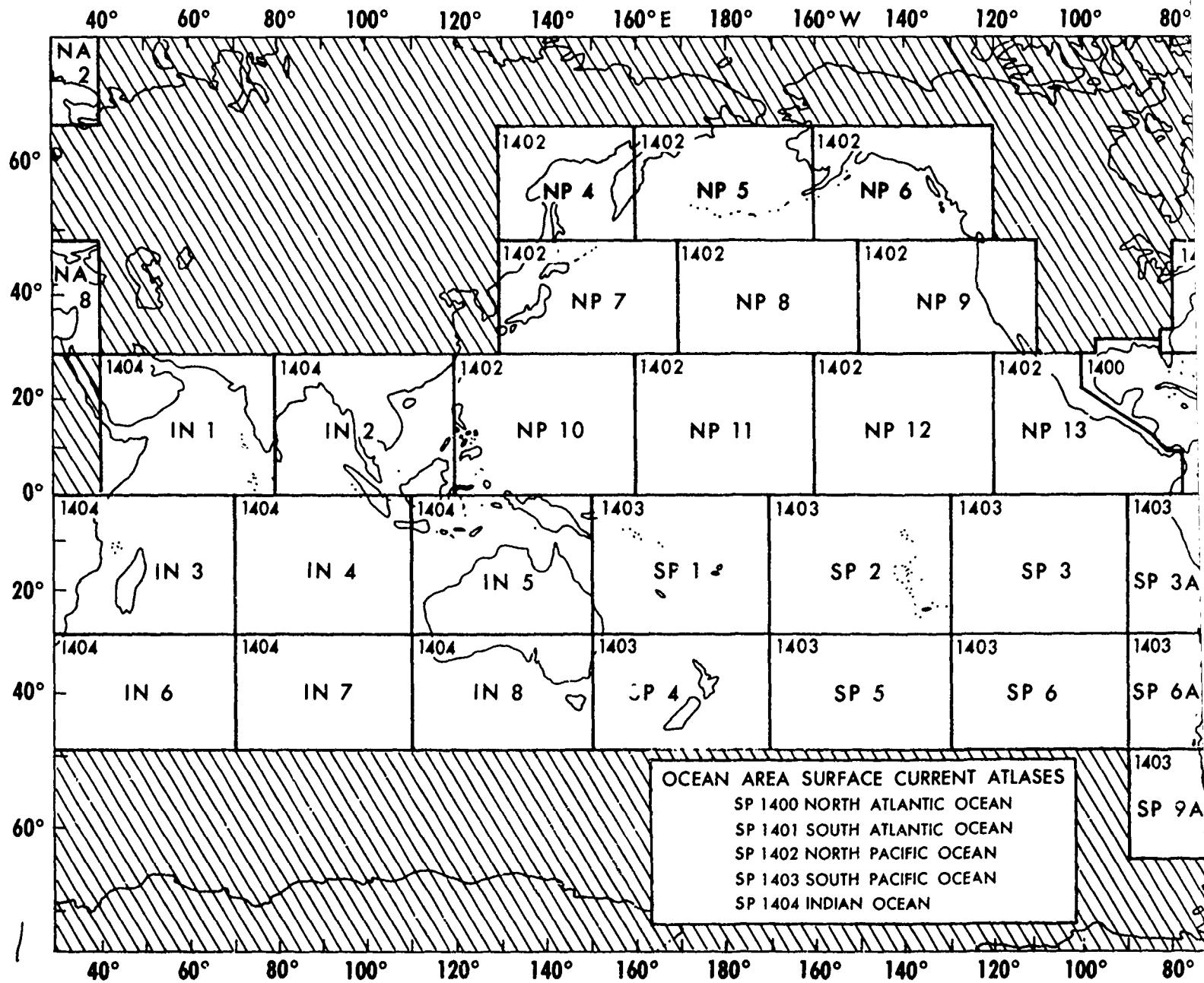
THIS SERIES OF COMPUTERIZED ATLASES REPLACES THE OLD HYDROGRAPHIC OFFICE ATLASES OF SURFACE CURRENTS (HOP 566, 568, 569, 570) WHICH WERE MANUALLY COMPILED FROM DATA OBTAINED DURING THE PERIOD 1903 - 1934. THESE NEW ATLASES CONFORM TO THE STANDARD NAVY OCEAN AREA AND REGION INDEX LIMITS SHOWN BELOW: e.g., NOO SP 1402-NP 10 COVERS NORTH PACIFIC REGION 10 EAST OF THE PHILIPPINES.

AS AMOUNTS OF NEW DATA WARRANT

THESE GRAPHICS MAY NOT COVER THE SAME AREAS AS THE NORTH SEA, PERSONAL CURRENTS ARE STRONGLY TIDAL, AND PREDICTABLE HOURLY CHANGES ARE UNPREDICTABLE.

RECENT IMPROVEMENTS IN THE DATA FILE ASSURE THE INCLUSION OF THE LATEST, HIGH QUALITY SURFACE CURRENT DATA AVAILABLE. THE FILE NOW CONTAINS MORE THAN 4,200,000 OBSERVATIONS AND A GENERAL UPDATE OF THE FILE WILL BE MADE.

INDEX

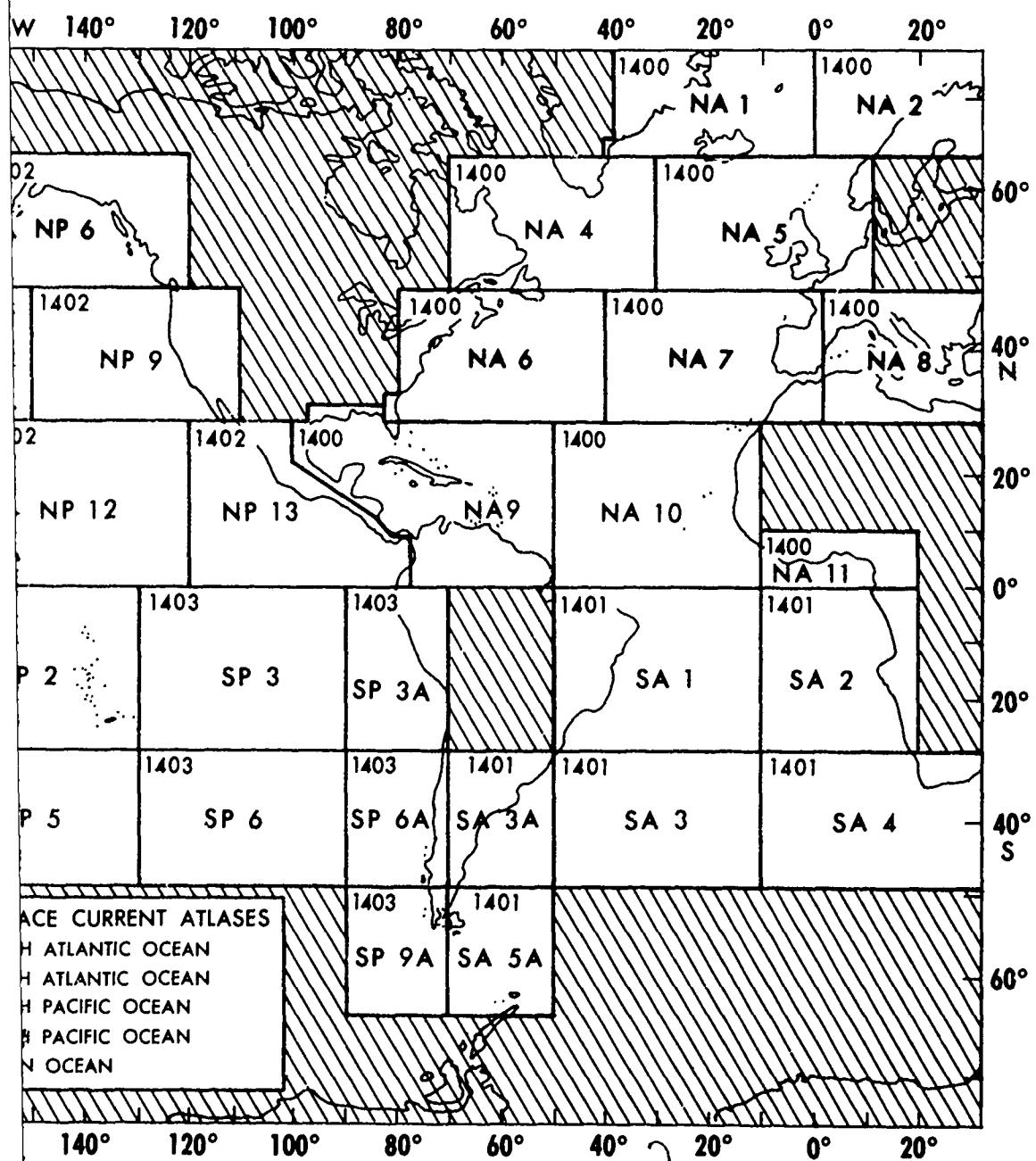


CURRENT ATLASES

AS AMOUNTS OF NEW DATA WARRANT, MOST LIKELY EVERY 12 - 18 MONTHS.

THESE GRAPHICS MAY NOT BE TRULY REPRESENTATIVE OF THE ACTUAL FLOW IN SUCH AREAS AS THE NORTH SEA, PERSIAN GULF, GULF OF THAILAND, AND YELLOW SEA WHERE CURRENTS ARE STRONGLY TIDAL. FOR SUCH AREAS, OTHER SOURCES DESCRIBING PREDICTABLE HOURLY CHANGES OF TIDAL CURRENTS SHOULD BE CONSULTED.

INDEX



Introduction

The Surface Current Data File, from which these atlases are derived, consists primarily of over four million ship set and drift observations. These data were collected by the Netherlands, Japan, Britain, France, and the United States. The file is supplemented by several thousand Geomagnetic Electrokinetograph (GEK) observations, mostly Japanese. The file spans the period from the early 1850's to the present. The earliest observations were collected by the Netherlands and Great Britain; those of the 1960's through the present are primarily United States data.

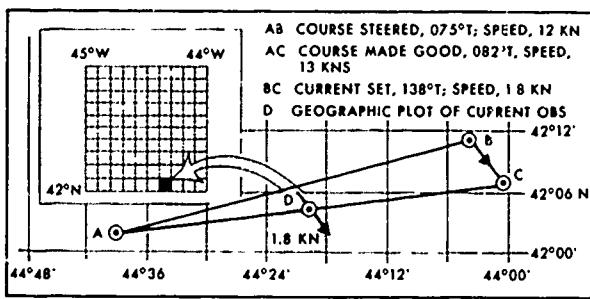
General Quality

The quality of this data file is considered high for this type of derived value. The data have been carefully screened for duplication; observations taken under adverse conditions (i.e. high winds and waves, time between observations greater than 12 hours) have been eliminated when warranted. Consideration was given to the reliability of the observer; doubtful shipboard computations of set and drift were edited; and observations with erroneous locations (mostly observations on land) have been eliminated. The accepted data are considered most useful when used collectively as in summaries where a number of observations show trends.

General Observation Technique

The set (direction) and drift (speed) are computed by the navigator from the difference between the dead reckoning (DR) position and the position determined by any type of navigational fix. The drift can be determined along any straight line track and includes all factors which cause changes in the DR position. When a fix is obtained, the current set (direction) is FROM the DR position TO the fix; the drift (speed) is equal to the distance in nautical miles between the DR and the fix, divided by the number of hours since the last fix. For successive observations, the TO POSITION of one observation becomes the FROM POSITION of the next observation.

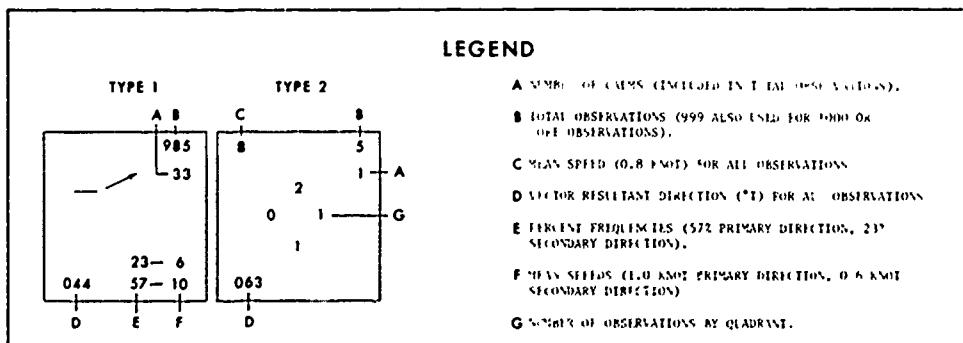
Because the influence of current may vary along a ship's track, the MEAN POSITION of the track is assigned as the geographic location of the current observation. An example of a current computation is shown in the figure below.



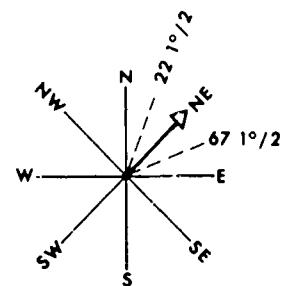
EXAMPLE OF A SURFACE CURRENT (SHIP'S DRIFT) OBSERVATION

Data Presentation

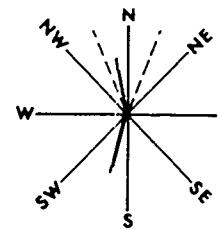
The following legend shows two types of surface current presentations by 1° quadrangle, type 1 with 12 or more observations and type 2 with fewer than 12 observations. Where there are 11 or fewer observations within a 1° quadrangle, the total number of observations is shown within the 90° quadrant containing the observations.



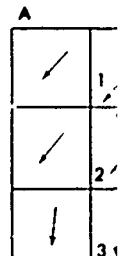
If there are 12 or more observations, the data are presented by vector resultants as follows:



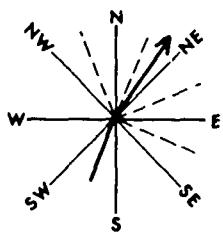
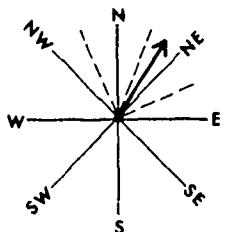
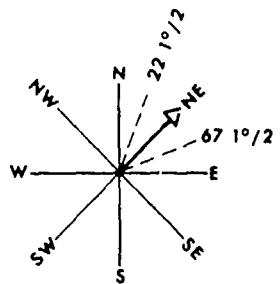
- (1) Persistent Current - 60 percent or more of all observations fall within a 45° sector of the 8-point compass.
- (2) Primary Current - All observations fall within a 45° sector of the 8-point compass.



- (4) Bizonal Flow - Practically all observations are concentrated in opposite pairs of sectors, and one pair contains at least 80 percent as many observations as the other. This generally indicates variation that occurs in zones of entrainment of opposing currents (see examples A, B, and C).



If there are 12 o. more observations in a 1° quadrangle, the surface current is depicted by vector resultants as follows:

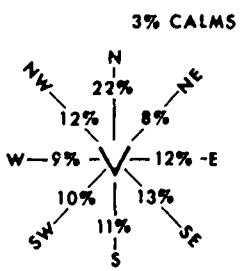
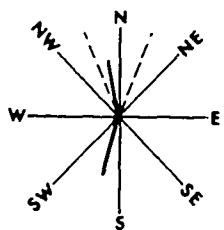


Persistent Current - 60 percent or more of all observations fall within a 45° sector of the 8-point compass.

(2) Prevailing Current - 70 percent or more of all observations fall within two adjacent 45° sectors.

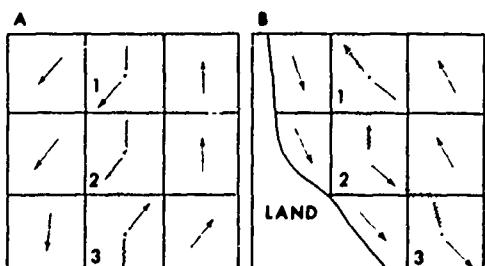
(3) Primary Current with Secondary Direction -
(a) Primary Current - 50 percent or more of all observations fall within three adjacent 45° sectors.

(b) Secondary Direction - 20 percent or more of all observations fall within a 45° sector, and the two resultant vector directions are separated by more than 90° of arc.



(4) Bizonal Flow - Practically all observations are concentrated in opposite pairs of 45° sectors, and one pair contains at least 80 percent as many observations as the opposite pair. This generally indicates variability that occurs in zones of entrainment between opposing currents (see examples A and B, quadrangles 1, 2, and 3).

(5) Variable Current - The 45° sector with most observations has less than 25 percent of all observations; direction is indeterminate.



	170 E	175 E	180	175 W	170 W	165 W
49 N

45 N

40 N

35 N

30 N

25 N

20 N

15 N

10 N

5 N

0 N

180

175 W

170 W
JANUARY

165 W

2

170 W
JANUARY

170 E		175 E		180		175 W		170 W		165 W	
49 N	170 E	175 E	180	175 W	170 W	165 W	170 E	175 E	180	175 W	170 W
49 N	000	001	002	003	004	005	006	007	008	009	00A
45 N	000	001	002	003	004	005	006	007	008	009	00A
40 N	000	001	002	003	004	005	006	007	008	009	00A
35 N	000	001	002	003	004	005	006	007	008	009	00A
30 N	000	001	002	003	004	005	006	007	008	009	00A
29 N	000	001	002	003	004	005	006	007	008	009	00A

FEBRUARY

70 W

165 W

160 W

155 W

150 W

49 N

45 N

40 N

35 N

30 N

23

W
ARY

170 W

165 W

160 W

155 W

150 W

49 N

45 N

40 N

35 N

30 N

29 N

0	2	5	10	0	7	1	0	1	8	0	0	5	0	0	1	8	0	0	0	2	0	0
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153 76	163 33	163 33	103 66	107 10	107 10	193 66	13 1	127 30	3	074 64	061 64	114 52	5	110 50	291 64	4 22 1	119 66	280 56	204 70	094 71	165 66	108 1

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270	162 2	103 70	5	117 32	11	152 62	3	061 0	108 66	5	210	110	156 66	3	108 2	171 80	4 22 1	108 80	8 20 5	167 56	103 56	10

0	4	13	5	0	2	0	0	1	2	11	3	0	4	10	0	2	1	3	0	2	1
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134 57	180 52	222 55	100 41	147 05	103 06	4	246 20	6	076 05	266 31	5	184 23	184	074 68	121 56	104 22	5	056	319 2	098 63	102 63	3 380

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170 E

49 N

175 E

180

175 W

170 W

165 W

45 N

40 N

35 N

30 N

29 N

170 E

175 E

180

175 W

170 W
APRIL

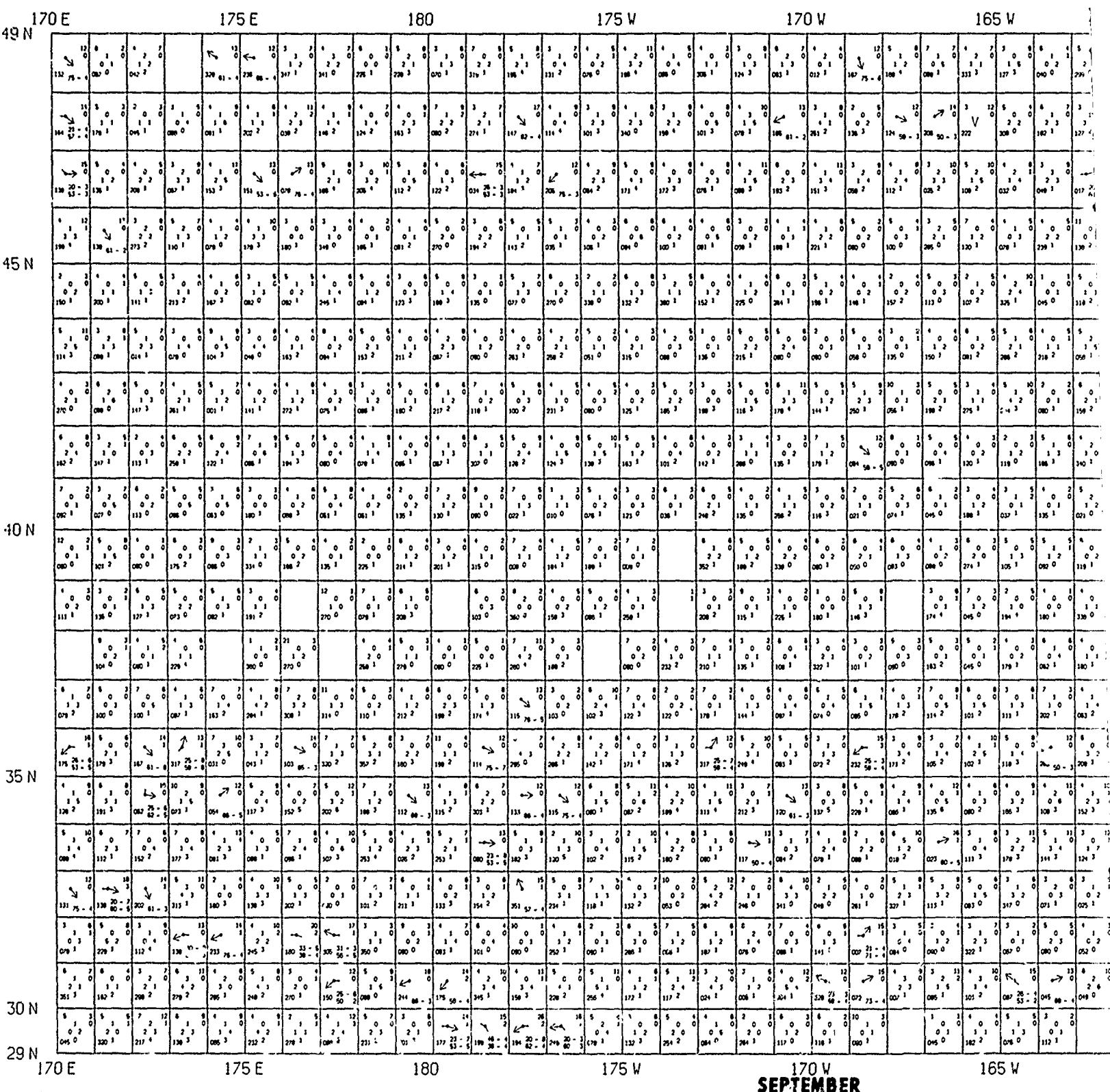
165 W

170 W	165 W	160 W	155 W	150 W
49 N				
45 N				
40 N				
35 N				
30 N				
29 N				

170 W 165 W 160 W 155 W 150 W

2

	170 E	175 E	180	175 W	170 W	165								
49 N	6 2 0 15 1 5 163 3 159 2 150 3	3 1 0 5 0 2 0 0 1 0 0 2 0 1 1 2	10 4 2 0 2 1 0 0 0 2 1 0 2 0 1 0 2 1	1 0 1 1 0 2 0 1 2 1 0 3 2 1 0 3 2 1 0 3	3 1 0 2 2 0 1 1 1 0 0 1 1 0 0 1 0 1 0 1	3 0 1 2 2 0 1 1 1 0 0 1 1 0 0 1 0 1 0 1	3 0 1 2 2 0 1 1 1 0 0 1 1 0 0 1 0 1 0 1	3 0 1 2 2 0 1 1 1 0 0 1 1 0 0 1 0 1 0 1	4 0 1 0 5 0 0 1 0 0 0 1 1 0 1 2 1 0 1 2	4 0 1 0 5 0 0 1 0 0 0 1 1 0 1 2 1 0 1 2	3 0 1 0 2 0 1 1 1 0 0 1 1 0 0 1 0 1 0 1	3 0 1 0 2 0 1 1 1 0 0 1 1 0 0 1 0 1 0 1	3 0 1 0 2 0 1 1 1 0 0 1 1 0 0 1 0 1 0 1	3 0 1 0 2 0 1 1 1 0 0 1 1 0 0 1 0 1 0 1
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40 N	2 1 0 0 1 0 1 0 0 0 0 0 0 0 0	4 4 0 0 2 0 0 0 0 0 0 0 0 0 0	3 3 0 2 0 0 0 1 0 0 0 0 0 0 0	3 2 0 2 0 0 0 1 0 0 0 0 0 0 0	3 3 0 2 0 0 0 1 0 0 0 0 0 0 0	3 0 0 2 0 0 0 1 0 0 0 0 0 0 0	3 0 0 2 0 0 0 1 0 0 0 0 0 0 0	3 0 0 2 0 0 0 1 0 0 0 0 0 0 0	3 2 0 2 0 0 0 1 0 0 0 0 0 0 0	3 2 0 2 0 0 0 1 0 0 0 0 0 0 0	3 0 0 2 0 0 0 1 0 0 0 0 0 0 0	3 0 0 2 0 0 0 1 0 0 0 0 0 0 0	3 0 0 2 0 0 0 1 0 0 0 0 0 0 0	3 0 0 2 0 0 0 1 0 0 0 0 0 0 0
35 N	3 0 0 0 0 3 0 0 1 0 0 0 0 0 0	6 1 0 1 1 0 0 2 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0
30 N	6 0 0 0 0 2 1 0 0 0 0 0 0 0 0	2 0 0 0 0 2 0 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0
29 N	5 0 0 0 0 2 1 0 0 0 0 0 0 0 0	3 0 0 0 0 2 0 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0	5 0 0 5 1 0 2 0 0 0 0 0 0 0 0
	170 E	175 E	180	175 W	170 W	165 W								
	170 E	175 E	180	175 W	AUGUST	165 W								



170 W
OCTOBER

	170 E	175 E	180	175 W	170 W	165
49 N	9 0 0 5 0 3 1 0 6 0 3 5 7 0 1 0 0 1 0 5 1 6 0 330 0 000 0 125 0 158 1 008 1 232 1 180 1 264 1 022 1 3 0 0 1 0 2 0 3 0 5 0 3 1 0 0 1 2 0 2 0 1 0 5 0 5 0 210 2 083 0 225 2 310 2 200 1 135 0 135 3 180 2 318 0 100 0 1 0 0 1 0 7 1 0 6 0 3 0 4 1 0 1 2 0 2 0 1 0 5 0 5 0 022 1 172 4 045 0 143 2 180 3 132 1 082 1 128 1 061 0 6 0 0 4 0 5 1 3 0 6 0 5 0 5 1 6 1 0 1 2 0 3 0 5 0 6 0 106 2 117 1 008 2 222 3 192 5 193 2 073 0 109 0 135 0 4 0 0 20 0 1 0 5 0 2 0 6 0 3 0 2 0 1 0 2 0 3 0 5 0 6 0 174 2 060 0 060 0 163 1 079 1 045 0 090 0 140 0 091 0 5 0 0 2 0 2 0 3 0 7 0 5 0 10 0 2 0 1 0 2 0 3 0 5 0 6 0 082 0 113 1 001 1 135 0 050 0 135 0 309 0 129 0 300 0 10 0 0 4 0 5 0 6 0 1 0 2 0 5 0 3 0 1 0 2 0 3 0 5 0 6 0 045 0 127 2 315 0 045 3 270 0 164 2 164 1 090 0 331 0 8 0 0 3 0 1 0 6 0 5 0 2 0 3 0 1 0 2 0 3 0 5 0 6 0 7 0 161 2 080 0 224 2 131 1 100 1 278 2 360 0 101 1 045 0 3 0 0 3 0 2 0 1 0 3 0 5 0 5 0 3 0 2 0 1 0 2 0 3 0 4 0 080 0 157 1 080 0 080 2 153 2 054 0 185 1 270 0 090 0 4 0 0 4 0 5 0 6 0 1 0 3 0 5 0 4 0 1 0 2 0 3 0 5 0 6 0 186 3 118 2 291 0 080 0 107 1 068 1 060 0 104 0 131 0 4 0 0 2 0 2 0 3 0 6 0 4 0 2 0 5 0 3 0 2 0 3 0 5 0 6 0 080 1 045 0 136 3 270 0 080 0 065 1 020 1 112 0 158 1 5 0 0 4 0 5 0 6 0 1 0 2 0 3 0 5 0 4 0 1 0 2 0 3 0 5 0 6 0 187 1 113 2 108 2 202 2 270 0 227 4 261 0 102 1 176 1 2 0 0 3 0 1 0 4 0 3 0 5 0 6 0 2 0 1 0 3 0 4 0 5 0 6 0 270 3 180 1 080 0 137 3 067 0 090 0 131 2 063 0 135 0 4 0 0 2 0 3 0 5 0 7 0 4 0 5 0 6 0 2 0 3 0 4 0 5 0 6 0 080 0 160 2 017 1 168 1 102 3 082 0 085 3 318 0 032 1 11 0 0 7 0 7 0 5 0 8 0 5 0 5 0 6 0 7 0 6 0 8 0 9 0 10 0 157 22 162 1 136 3 258 1 356 2 111 2 130 1 150 3 100 4 4 0 0 1 0 2 0 3 0 4 0 5 0 6 0 7 0 8 0 9 0 10 0 11 0 12 0 133 53 102 3 097 2 105 1 104 4 203 3 066 3 073 1 146 1 16 0 0 21 0 4 0 15 0 12 0 8 0 11 0 1 0 10 0 13 0 17 0 21 0 211 56 119 71 102 53 100 75 116 75 136 1 124 1 180 66 1 15 4 0 5 0 12 0 12 0 10 0 24 0 20 0 11 0 10 0 12 0 15 0 18 0 145 70 119 1 180 3 199 66 0 095 4 304 1 254 52 1 095 3 4 0 0 15 0 12 0 22 0 8 0 10 0 12 0 2 0 11 0 13 0 17 0 20 0 151 1 271 3 180 22 0 210 5 137 70 157 75 109 4 108 50 4 4 2 0 11 0 19 0 12 0 21 0 15 0 12 0 10 0 18 0 20 0 14 0 18 0 163 3 110 1 227 5 108 50 130 64 108 50 108 52 1 098 50 4 170 E 175 E 180 175 W 170 W 165 W DECEMBER					

BER

ANNUAL-JAN THROUGH DEC

165 W

160 W

155 W

150 W

49 N

8	20	12	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	
V	080 50 - 1	117 61 - 1	110 50 - 1	018 50 - 1	115 60 - 1	119 50 - 1	V	1	1	1	1	V	1	V	1	V	1	V	1	
5	82	V	79	87	V	78	3	99	5	105	V	80	V	81	82	83	84	85	86	
150	121 56 - 1	080 50 - 1	136 56 - 1	136 50 - 1	086 V	106 56 - 1	083 V	108 52 - 1	127 50 - 1	086	124	V	080 V	120	080 53 - 1	084 53 - 1	V	82	80	
4	112	V	111	110	V	109	2	V	120	4	112	V	106 2	V	124 4	V	125 2	V	123 4	
107	125	108 50 - 1	107 52 - 1	113 56 - 1	111 50 - 1	079 53 - 1	101 50 - 1	080 51 - 1	080 52 - 1	086	086 54 - 1	100	108 56 - 1	112 53 - 1	083 50 - 1	080 50 - 1	V	99	93	
109	64 - 1	V	123 56 - 1	157	131	140 53 - 1	132 53 - 1	115 50 - 1	110 50 - 1	123 50 - 1	114 52 - 1	108 50 - 1	102 50 - 1	106 50 - 1	082 50 - 1	084 50 - 1	081 50 - 1	V	102	112
145	53 - 1	V	120 50 - 1	127	080 52 - 1	137	156 56 - 1	132 53 - 1	103 50 - 1	138 52 - 1	083	132 52 - 1	176 53 - 1	153	131 50 - 1	131 50 - 1	130 50 - 1	V	75	111
080	52 - 1	128 50 - 1	123 56 - 1	111 51 - 1	127 50 - 1	080 50 - 1	104 56 - 1	107 51 - 1	082 56 - 1	085 56 - 1	080 57 - 1	150 54 - 1	107 52 - 1	123 54 - 1	020 50 - 1	086 52 - 1	079 52 - 1	V	95	
140	51 - 1	121 50 - 1	182 51 - 1	116 56 - 1	134	V	070 50 - 1	108 50 - 1	174 56 - 1	108 51 - 1	083 52 - 1	108 50 - 1	086 51 - 1	130 50 - 1	118 53 - 1	073 50 - 1	088	V	110 56 - 1	
112	61 - 1	121 55 - 1	122 73 - 1	080 64 - 1	089 52 - 1	100 53 - 1	088 50 - 1	156 52 - 1	175 50 - 1	234 54 - 1	110 53 - 1	150	112 63 - 1	110 60 - 1	173	114 56 - 1	113 61 - 1	V	82	
086	50 - 1	120 53 - 1	112 50 - 1	119 50 - 1	087 54 - 1	129 52 - 1	101 50 - 1	104 56 - 1	086	215 52 - 1	073 50 - 1	084 56 - 1	058	178 52 - 1	108	127	086 53 - 1	V	80	
080	56 - 1	124 56 - 1	152 53 - 1	140 61 - 1	086 50 - 1	136 52 - 1	177 56 - 1	105 54 - 1	105 58 - 1	125 66 - 1	102 60 - 1	140 54 - 1	106 52 - 1	107 54 - 1	110 52 - 1	108 50 - 1	123 56 - 1	V	74	
107	56 - 1	V	115 63 - 1	088 50 - 1	113 54 - 1	087 50 - 1	042 56 - 1	083 64 - 1	108 50 - 1	129 57 - 1	107 58 - 1	086 56 - 1	107 58 - 1	100 54 - 1	108 52 - 1	111 61 - 1	104 67 - 1	V	82	
085	55 - 1	V	127 52 - 1	081 60 - 1	125 50 - 1	122 52 - 1	083 50 - 1	120 52 - 1	122 50 - 1	077 56 - 1	122 52 - 1	120 50 - 1	120 50 - 1	120 50 - 1	101 56 - 1	102 56 - 1	103 56 - 1	130 56 - 1	V	
130	70 - 1	126 63 - 1	131 52 - 1	103 52 - 1	122 57 - 5	094 61 - 1	131 50 - 1	119 56 - 1	150 66 - 1	122 62 - 1	140 52 - 1	125 60 - 1	120 61 - 1	120 60 - 1	101 56 - 1	102 56 - 1	103 56 - 1	130 56 - 1	V	
100	64 - 1	120 57 - 1	153 63 - 1	129 53 - 1	139	V	131 56 - 1	120 57 - 1	108 58 - 1	094 56 - 1	094 60 - 1	086 53 - 1	146	142 64 - 1	101 58 - 1	114 58 - 1	114 58 - 1	V	82	
110	52 - 1	V	132 56 - 1	131	114 54 - 1	087 60 - 1	101 50 - 1	119	083 56 - 1	088 56 - 1	100 53 - 1	106 56 - 1	079 56 - 1	104	104 52 - 1	082 53 - 1	071 50 - 1	V	75	
129	7	V	125 52 - 1	177	126	124	V	120	126	125	132	V	124	129	128	127	V	126	125	
115	61 - 1	102 57 - 1	116 62 - 1	082 56 - 1	110 56 - 1	101 54 - 1	103 56 - 1	088 51 - 1	093 57 - 1	113 56 - 1	087 54 - 1	120	085 62 - 1	083 50 - 1	081 56 - 1	120 54 - 1	121 54 - 1	V	75	
091	62 - 1	102 59 - 1	125 56 - 1	116 62 - 1	082 56 - 1	120 53 - 1	102 56 - 1	085 60 - 1	088 57 - 1	100 60 - 1	075 63 - 1	106 61 - 1	110 52 - 1	108 66 - 1	106 64 - 1	080 66 - 1	077 51 - 1	V	72	
119	7	V	121 4	125 7	102	111 3	111 5	112	104	105	117	V	100	99	102	4	98	2	110 4	
105	51 - 1	117 52 - 1	100 52 - 1	111 56 - 1	119	V	116 50 - 1	116 50 - 1	100 58 - 1	108 60 - 1	123 56 - 1	098 58 - 1	110	090 53 - 1	097	108	V	V	V	
081	52 - 1	V	103 4	97	103	100 4	98	101	V	104 50 - 1	102 50 - 1	103	V	105	106	107	6	7	110 4	
171	54 - 1	120 56 - 1	080 50 - 1	124	108 54 - 1	110 53 - 1	078	127 50 - 1	096	093 52 - 1	096 51 - 1	261 20 - 1	098 51 - 1	088 50 - 1	098 50 - 1	096	090 53 - 1	V	V	V
194	55 - 1	096 56	109 50 - 1	098 53 - 1	080 56 - 1	111 64 - 1	091 57 - 1	078 56 - 1	093 66 - 1	115 60 - 1	097 53 - 1	191 33 - 1	093 50 - 1	107 53 - 1	108 66 - 1	108 66 - 1	091 66 - 1	V	V	
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106	52 - 1	119 66 - 1	094 57 - 1	107 66 - 1	110 56 - 1	080 50 - 1	113 64 - 1	095 60 - 1	102 62 - 1	098 50 - 1	113 72 - 1	098 56 - 1	227	121 62 - 1	108 66 - 1	092 66 - 1	011 66 - 1	V	76	

30 N

29 N

165 W

160 W

155 W

150 W

35 N

40 N

45 N

49 N

2

EC

170 E		175 E		180		175 W		170 W		165 W	
49 N											
→ 16 061	→ 10 020	5 1 041	9 3 043	11 0 191	15 2 191	19 4 191	20 4 191	15 4 191	19 4 191	19 0 191	5 1 191
→ 16 062	→ 10 020	5 2 042	9 2 042	11 0 191	15 3 191	19 5 191	20 5 191	15 5 191	19 5 191	19 0 191	5 2 191
→ 16 063	→ 10 020	5 3 043	9 3 043	11 1 191	15 4 191	19 6 191	20 6 191	15 6 191	19 6 191	19 0 191	5 3 191
→ 16 064	→ 10 020	5 4 044	9 4 044	11 2 191	15 5 191	19 7 191	20 7 191	15 7 191	19 7 191	19 0 191	5 4 191
→ 16 065	→ 10 020	5 5 045	9 5 045	11 3 191	15 6 191	19 8 191	20 8 191	15 8 191	19 8 191	19 0 191	5 5 191
→ 16 066	→ 10 020	5 6 046	9 6 046	11 4 191	15 7 191	19 9 191	20 9 191	15 9 191	19 9 191	19 0 191	5 6 191
→ 16 067	→ 10 020	5 7 047	9 7 047	11 5 191	15 8 191	19 10 191	20 10 191	15 10 191	19 10 191	19 0 191	5 7 191
→ 16 068	→ 10 020	5 8 048	9 8 048	11 6 191	15 9 191	19 11 191	20 11 191	15 11 191	19 11 191	19 0 191	5 8 191
→ 16 069	→ 10 020	5 9 049	9 9 049	11 7 191	15 10 191	19 12 191	20 12 191	15 12 191	19 12 191	19 0 191	5 9 191
→ 16 070	→ 10 020	5 10 050	9 10 050	11 8 191	15 11 191	19 13 191	20 13 191	15 13 191	19 13 191	19 0 191	5 10 191
→ 16 071	→ 10 020	5 11 051	9 11 051	11 9 191	15 12 191	19 14 191	20 14 191	15 14 191	19 14 191	19 0 191	5 11 191
→ 16 072	→ 10 020	5 12 052	9 12 052	11 10 191	15 13 191	19 15 191	20 15 191	15 15 191	19 15 191	19 0 191	5 12 191
→ 16 073	→ 10 020	5 13 053	9 13 053	11 11 191	15 14 191	19 16 191	20 16 191	15 16 191	19 16 191	19 0 191	5 13 191
→ 16 074	→ 10 020	5 14 054	9 14 054	11 12 191	15 15 191	19 17 191	20 17 191	15 17 191	19 17 191	19 0 191	5 14 191
→ 16 075	→ 10 020	5 15 055	9 15 055	11 13 191	15 16 191	19 18 191	20 18 191	15 18 191	19 18 191	19 0 191	5 15 191
→ 16 076	→ 10 020	5 16 056	9 16 056	11 14 191	15 17 191	19 19 191	20 19 191	15 19 191	19 19 191	19 0 191	5 16 191
→ 16 077	→ 10 020	5 17 057	9 17 057	11 15 191	15 18 191	19 20 191	20 20 191	15 20 191	19 20 191	19 0 191	5 17 191
→ 16 078	→ 10 020	5 18 058	9 18 058	11 16 191	15 19 191	19 21 191	20 21 191	15 21 191	19 21 191	19 0 191	5 18 191
→ 16 079	→ 10 020	5 19 059	9 19 059	11 17 191	15 20 191	19 22 191	20 22 191	15 22 191	19 22 191	19 0 191	5 19 191
→ 16 080	→ 10 020	5 20 060	9 20 060	11 18 191	15 21 191	19 23 191	20 23 191	15 23 191	19 23 191	19 0 191	5 20 191
→ 16 081	→ 10 020	5 21 061	9 21 061	11 19 191	15 22 191	19 24 191	20 24 191	15 24 191	19 24 191	19 0 191	5 21 191
→ 16 082	→ 10 020	5 22 062	9 22 062	11 20 191	15 23 191	19 25 191	20 25 191	15 25 191	19 25 191	19 0 191	5 22 191
→ 16 083	→ 10 020	5 23 063	9 23 063	11 21 191	15 24 191	19 26 191	20 26 191	15 26 191	19 26 191	19 0 191	5 23 191
→ 16 084	→ 10 020	5 24 064	9 24 064	11 22 191	15 25 191	19 27 191	20 27 191	15 27 191	19 27 191	19 0 191	5 24 191
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→ 16 086	→ 10 020	5 26 066	9 26 066	11 24 191	15 27 191	19 29 191	20 29 191	15 29 191	19 29 191	19 0 191	5 26 191
→ 16 087	→ 10 020	5 27 067	9 27 067	11 25 191	15 28 191	19 30 191	20 30 191	15 30 191	19 30 191	19 0 191	5 27 191
→ 16 088	→ 10 020	5 28 068	9 28 068	11 26 191	15 29 191	19 31 191	20 31 191	15 31 191	19 31 191	19 0 191	5 28 191
→ 16 089	→ 10 020	5 29 069	9 29 069	11 27 191	15 30 191	19 32 191	20 32 191	15 32 191	19 32 191	19 0 191	5 29 191
→ 16 090	→ 10 020	5 30 070	9 30 070	11 28 191	15 31 191	19 33 191	20 33 191	15 33 191	19 33 191	19 0 191	5 30 191
→ 16 091	→ 10 020	5 31 071	9 31 071	11 29 191	15 32 191	19 34 191	20 34 191	15 34 191	19 34 191	19 0 191	5 31 191
→ 16 092	→ 10 020	5 32 072	9 32 072	11 30 191	15 33 191	19 35 191	20 35 191	15 35 191	19 35 191	19 0 191	5 32 191
→ 16 093	→ 10 020	5 33 073	9 33 073	11 31 191	15 34 191	19 36 191	20 36 191	15 36 191	19 36 191	19 0 191	5 33 191
→ 16 094	→ 10 020	5 34 074	9 34 074	11 32 191	15 35 191	19 37 191	20 37 191	15 37 191	19 37 191	19 0 191	5 34 191
→ 16 095	→ 10 020	5 35 075	9 35 075	11 33 191	15 36 191	19 38 191	20 38 191	15 38 191	19 38 191	19 0 191	5 35 191
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→ 16 097	→ 10 020	5 37 077	9 37 077	11 35 191	15 38 191	19 40 191	20 40 191	15 40 191	19 40 191	19 0 191	5 37 191
→ 16 098	→ 10 020	5 38 078	9 38 078	11 36 191	15 39 191	19 41 191	20 41 191	15 41 191	19 41 191	19 0 191	5 38 191
→ 16 099	→ 10 020	5 39 079	9 39 079	11 37 191	15 40 191	19 42 191	20 42 191	15 42 191	19 42 191	19 0 191	5 39 191
→ 16 100	→ 10 020	5 40 080	9 40 080	11 38 191	15 41 191	19 43 191	20 43 191	15 43 191	19 43 191	19 0 191	5 40 191
→ 16 101	→ 10 020	5 41 081	9 41 081	11 39 191	15 42 191	19 44 191	20 44 191	15 44 191	19 44 191	19 0 191	5 41 191
→ 16 102	→ 10 020	5 42 082	9 42 082	11 40 191	15 43 191	19 45 191	20 45 191	15 45 191	19 45 191	19 0 191	5 42 191
→ 16 103	→ 10 020	5 43 083	9 43 083	11 41 191	15 44 191	19 46 191	20 46 191	15 46 191	19 46 191	19 0 191	5 43 191
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→ 16 105	→ 10 020	5 45 085	9 45 085	11 43 191	15 46 191	19 48 191	20 48 191	15 48 191	19 48 191	19 0 191	5 45 191
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→ 16 109	→ 10 020	5 49 089	9 49 089	11 47 191	15 50 191	19 52 191	20 52 191	15 52 191	19 52 191	19 0 191	5 49 191
→ 16 110	→ 10 020	5 50 090	9 50 090	11 48 191	15 51 191	19 53 191	20 53 191	15 53 191	19 53 191	19 0 191	5 50 191
→ 16 111	→ 10 020	5 51 091	9 51 091	11 49 191	15 52 191	19 54 191	20 54 191	15 54 191	19 54 191	19 0 191	5 51 191
→ 16 112	→ 10 020	5 52 092	9 52 092	11 50 191	15 53 191	19 55 191	20 55 191	15 55 191	19 55 191	19 0 191	5 52 191
→ 16 113	→ 10 020	5 53 093	9 53 093	11 51 191	15 54 191	19 56 191	20 56 191	15 56 191	19 56 191	19 0 191	5 53 191
→ 16 114	→ 10 020	5 54 094	9 54 094	11 52 191	15 55 191	19 57 191	20 57 191	15 57 191	19 57 191	19 0 191	5 54 191
→ 16 115	→ 10 020	5 55 095	9 55 095	11 53 191	15 56 191	19 58 191	20 58 191	15 58 191	19 58 191	19 0 191	5 55 191
→ 16 116	→ 10 020	5 56 096	9 56 096	11 54 191	15 57 191	19 59 191	20 59 191	15 59 191	19 59 191	19 0 191	5 56 191
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→ 16 120	→ 10 020	5 60 100	9 60 100	11 58 191	15 61 191	19 63 191	20 63 191	15 63 191	19 63 191	19 0 191	5 60 191
→ 16 121	→ 10 020	5 61 101	9 61 101	11 59 191	15 62 191	19 64 191	20 64 191	15 64 191	19 64 191	19 0 191	5 61 191
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→ 16 126	→ 10 020	5 66 106	9 66 106	11 64 191	15 67 191	19 69 191	20 69 191	15 69 191	19 69 191	19 0 191	5 66 191
→ 16 127	→ 10 020	5 67 107									

WINTER-JAN, FEB, MAR

		165 W								160 W								155 W								
		49 N				45 N				40 N				35 N				30 N				29 N				
15	6	8	0	→	17	5	11	4	10	5	8	4	2	8	5	0	→	19	4	1	0	4	0	6	2	1
16	1	6	0	→	18	3	1	2	3	1	4	2	0	3	3	0	→	20	1	2	0	3	0	5	2	0
17	0	0	0	→	19	5	13	3	1	2	0	1	4	2	0	0	→	21	0	1	0	3	0	6	2	0
18	-	0	0	→	20	5	14	4	1	2	0	1	4	2	0	0	→	22	0	1	0	3	0	6	2	0
19	0	0	0	→	21	6	15	5	1	2	0	1	4	2	0	0	→	23	0	1	0	3	0	6	2	0
20	-	0	0	→	22	7	16	6	1	2	0	1	4	2	0	0	→	24	0	1	0	3	0	6	2	0
21	0	0	0	→	23	8	17	7	1	2	0	1	4	2	0	0	→	25	0	1	0	3	0	6	2	0
22	-	0	0	→	24	9	18	8	1	2	0	1	4	2	0	0	→	26	0	1	0	3	0	6	2	0
23	0	0	0	→	25	10	19	9	1	2	0	1	4	2	0	0	→	27	0	1	0	3	0	6	2	0
24	-	0	0	→	26	11	20	10	1	2	0	1	4	2	0	0	→	28	0	1	0	3	0	6	2	0
25	0	0	0	→	27	12	21	11	1	2	0	1	4	2	0	0	→	29	0	1	0	3	0	6	2	0
26	-	0	0	→	28	13	22	12	1	2	0	1	4	2	0	0	→	30	0	1	0	3	0	6	2	0
27	0	0	0	→	29	14	23	13	1	2	0	1	4	2	0	0	→	31	0	1	0	3	0	6	2	0
28	-	0	0	→	30	15	24	14	1	2	0	1	4	2	0	0	→	32	0	1	0	3	0	6	2	0
29	0	0	0	→	31	16	25	15	1	2	0	1	4	2	0	0	→	33	0	1	0	3	0	6	2	0
30	-	0	0	→	32	17	26	16	1	2	0	1	4	2	0	0	→	34	0	1	0	3	0	6	2	0
31	0	0	0	→	33	18	27	17	1	2	0	1	4	2	0	0	→	35	0	1	0	3	0	6	2	0
32	-	0	0	→	34	19	28	18	1	2	0	1	4	2	0	0	→	36	0	1	0	3	0	6	2	0
33	0	0	0	→	35	20	29	19	1	2	0	1	4	2	0	0	→	37	0	1	0	3	0	6	2	0
34	-	0	0	→	36	21	30	20	1	2	0	1	4	2	0	0	→	38	0	1	0	3	0	6	2	0
35	0	0	0	→	37	22	31	21	1	2	0	1	4	2	0	0	→	39	0	1	0	3	0	6	2	0
36	-	0	0	→	38	23	32	22	1	2	0	1	4	2	0	0	→	40	0	1	0	3	0	6	2	0
37	0	0	0	→	39	24	33	23	1	2	0	1	4	2	0	0	→	41	0	1	0	3	0	6	2	0
38	-	0	0	→	40	25	34	24	1	2	0	1	4	2	0	0	→	42	0	1	0	3	0	6	2	0
39	0	0	0	→	41	26	35	25	1	2	0	1	4	2	0	0	→	43	0	1	0	3	0	6	2	0
40	-	0	0	→	42	27	36	26	1	2	0	1	4	2	0	0	→	44	0	1	0	3	0	6	2	0
41	0	0	0	→	43	28	37	27	1	2	0	1	4	2	0	0	→	45	0	1	0	3	0	6	2	0
42	-	0	0	→	44	29	38	28	1	2	0	1	4	2	0	0	→	46	0	1	0	3	0	6	2	0
43	0	0	0	→	45	30	39	29	1	2	0	1	4	2	0	0	→	47	0	1	0	3	0	6	2	0
44	-	0	0	→	46	31	40	30	1	2	0	1	4	2	0	0	→	48	0	1	0	3	0	6	2	0
45	0	0	0	→	47	32	41	31	1	2	0	1	4	2	0	0	→	49	0	1	0	3	0	6	2	0
46	-	0	0	→	48	33	42	32	1	2	0	1	4	2	0	0	→	50	0	1	0	3	0	6	2	0
47	0	0	0	→	49	34	43	33	1	2	0	1	4	2	0	0	→	51	0	1	0	3	0	6	2	0
48	-	0	0	→	50	35	44	34	1	2	0	1	4	2	0	0	→	51	0	1	0	3	0	6	2	0
49	0	0	0	→	51	36	45	35	1	2	0	1	4	2	0	0	→	52	0	1	0	3	0	6	2	0
50	-	0	0	→	52	37	46	36	1	2	0	1	4	2	0	0	→	53	0	1	0	3	0	6	2	0
51	0	0	0	→	53	38	47	37	1	2	0	1	4	2	0	0	→	54	0	1	0	3	0	6	2	0
52	-	0	0	→	54	39	48	38	1	2	0	1	4	2	0	0	→	55	0	1	0	3	0	6	2	0
53	0	0	0	→	55	40	49	39	1	2	0	1	4	2	0	0	→	56	0	1	0	3	0	6	2	0
54	-	0	0	→	56	41	50	40	1	2	0	1	4	2	0	0	→	57	0	1	0	3	0	6	2	0
55	0	0	0	→	57	42	51	41	1	2	0	1	4	2	0	0	→	58	0	1	0	3	0	6	2	0
56	-	0	0	→	58	43	52	42	1	2	0	1	4	2	0	0	→	59	0	1	0	3	0	6	2	0
57	0	0	0	→	59	44	53	43	1	2	0	1	4	2	0	0	→	60	0	1	0	3	0	6	2	0
58	-	0	0	→	60	45	54	44	1	2	0	1	4	2	0	0	→	61	0	1	0	3	0	6	2	0
59	0	0	0	→	61	46	55	45	1	2	0	1	4	2	0	0	→	62	0	1	0	3	0	6	2	0
60	-	0	0	→	62	47	56	46	1	2	0	1	4	2	0	0	→	63	0	1	0	3	0	6	2	0
61	0	0	0	→	63	48	57	47	1	2	0	1	4	2	0	0	→	64	0	1	0	3	0	6	2	0
62	-	0	0	→	64	49	58	48	1	2	0	1	4	2	0	0	→	65	0	1	0	3	0	6	2	0
63	0	0	0	→	65	50	59	49	1	2	0	1	4	2	0	0	→	66	0	1	0	3	0	6	2	0
64	-	0	0	→	66	51	60	50	1	2	0	1	4	2	0	0	→	67	0	1	0	3	0	6	2	0
65	0	0	0	→	67	52	61	51	1	2	0	1	4	2	0	0	→	68	0	1	0	3	0	6	2	0
66	-	0	0	→	68	53	62	52	1	2	0	1	4	2	0	0	→	69	0	1	0	3	0	6	2	0
67	0	0	0	→	69	54	63	53	1	2	0	1	4	2	0	0	→	70	0	1	0	3	0	6	2	0
68	-	0	0	→	70	55	64	54	1	2	0	1	4	2	0	0	→	71	0	1	0	3	0	6	2	0
69	0	0	0	→	71	56	65	55	1	2	0	1	4	2	0	0	→	72	0	1	0	3	0	6	2	0
70	-	0	0	→	72	57	66	56	1	2	0	1	4	2	0	0	→	73	0	1	0	3	0	6	2	0
71	0	0	0	→	73	58	67	57	1	2	0	1	4	2	0	0	→	74	0	1	0	3	0	6	2	0
72	-	0	0	→	74	59	68	58	1	2	0	1	4	2	0	0	→	75	0	1	0	3	0	6	2	0
73	0	0	0	→	75	60	69	59	1	2	0	1	4	2	0	0	→	76	0	1	0	3	0	6	2	0
74	-	0	0	→	76	61	70	60	1	2	0	1	4	2	0	0	→	77	0	1	0	3	0	6	2	0
75	0	0	0	→	77	62	71	61	1	2	0	1	4	2	0	0	→	78	0	1	0	3	0	6	2	0
76	-	0	0	→	78	63	72	62	1	2	0	1	4	2	0	0	→	79	0	1	0	3	0	6	2	0
77	0	0	0	→	79	64	73	63	1	2	0	1	4	2	0	0	→	80	0	1	0	3	0	6	2	0
78	-	0	0	→	80	65	74	64	1	2	0	1	4	2	0	0	→	81	0	1	0	3	0	6	2	0
79	0	0	0	→	81	66	75	65	1	2	0	1	4	2	0	0	→	82	0	1	0	3	0	6	2	0
80	-	0	0	→	82	67	76	66	1	2	0	1	4	2	0	0	→	83	0	1	0	3	0	6	2	0
81	0	0	0	→	83	68	77	67	1	2	0	1	4	2	0	0	→	84	0	1	0	3	0	6	2	0
82	-																									

165 W

160 W

155 W

150 W

2

FEB, MAR

170 E		175 E		180		175 W		170 W		165 W	
49 N											
42°	20°	32°	15°	30°	25°	30°	20°	15°	5°	20°	15°
41°	15°	25°	10°	30°	20°	30°	20°	15°	5°	20°	15°
40°	10°	20°	5°	30°	20°	30°	20°	15°	5°	20°	15°
39°	5°	15°	0°	20°	10°	20°	10°	10°	0°	20°	10°
38°	0°	10°	-5°	15°	10°	15°	10°	10°	-5°	15°	10°
37°	-5°	15°	-10°	20°	15°	20°	15°	15°	-10°	20°	15°
36°	0°	10°	-15°	15°	10°	15°	10°	10°	-15°	15°	10°
35°	-10°	15°	-20°	20°	15°	20°	15°	15°	-20°	20°	15°
34°	-15°	20°	-25°	25°	20°	25°	20°	20°	-25°	25°	20°
33°	-20°	25°	-30°	30°	25°	30°	25°	25°	-30°	30°	25°
32°	-25°	30°	-35°	35°	30°	35°	30°	30°	-35°	35°	30°
31°	-30°	35°	-40°	40°	35°	40°	35°	35°	-40°	40°	35°
30°	-35°	40°	-45°	45°	40°	45°	40°	40°	-45°	45°	40°
29°	-40°	45°	-50°	50°	45°	50°	45°	45°	-50°	50°	45°
28°	-45°	50°	-55°	55°	50°	55°	50°	50°	-55°	55°	50°
27°	-50°	55°	-60°	60°	55°	60°	55°	55°	-60°	60°	55°
26°	-55°	60°	-65°	65°	60°	65°	60°	60°	-65°	65°	60°
25°	-60°	65°	-70°	70°	65°	70°	65°	65°	-70°	70°	65°
24°	-65°	70°	-75°	75°	70°	75°	70°	70°	-75°	75°	70°
23°	-70°	75°	-80°	80°	75°	80°	75°	75°	-80°	80°	75°
22°	-75°	80°	-85°	85°	80°	85°	80°	80°	-85°	85°	80°
21°	-80°	85°	-90°	90°	85°	90°	85°	85°	-90°	90°	85°
20°	-85°	90°	-95°	95°	90°	95°	90°	90°	-95°	95°	90°
19°	-90°	95°	-100°	100°	95°	100°	95°	95°	-100°	100°	95°
18°	-95°	100°	-105°	105°	100°	105°	100°	100°	-105°	105°	100°
17°	-100°	105°	-110°	110°	105°	110°	105°	105°	-110°	110°	105°
16°	-105°	110°	-115°	115°	110°	115°	110°	110°	-115°	115°	110°
15°	-110°	115°	-120°	120°	115°	120°	115°	115°	-120°	120°	115°
14°	-115°	120°	-125°	125°	120°	125°	120°	120°	-125°	125°	120°
13°	-120°	125°	-130°	130°	125°	130°	125°	125°	-130°	130°	125°
12°	-125°	130°	-135°	135°	130°	135°	130°	130°	-135°	135°	130°
11°	-130°	135°	-140°	140°	135°	140°	135°	135°	-140°	140°	135°
10°	-135°	140°	-145°	145°	140°	145°	140°	140°	-145°	145°	140°
9°	-140°	145°	-150°	150°	145°	150°	145°	145°	-150°	150°	145°
8°	-145°	150°	-155°	155°	150°	155°	150°	150°	-155°	155°	150°
7°	-150°	155°	-160°	160°	155°	160°	155°	155°	-160°	160°	155°
6°	-155°	160°	-165°	165°	160°	165°	160°	160°	-165°	165°	160°
5°	-160°	165°	-170°	170°	165°	170°	165°	165°	-170°	170°	165°
4°	-165°	170°	-175°	175°	170°	175°	170°	170°	-175°	175°	170°
3°	-170°	175°	-180°	180°	175°	180°	175°	175°	-180°	180°	175°
2°	-175°	180°	-185°	185°	180°	185°	180°	180°	-185°	185°	180°
1°	-180°	185°	-190°	190°	185°	190°	185°	185°	-190°	190°	185°
0°	-185°	190°	-195°	195°	190°	195°	190°	190°	-195°	195°	190°
29 N											
28 N	20°	32°	15°	30°	20°	30°	20°	15°	5°	20°	15°
27 N	15°	25°	10°	30°	10°	30°	10°	10°	0°	20°	10°
26 N	10°	20°	5°	30°	10°	30°	10°	10°	-5°	20°	10°
25 N	5°	15°	0°	20°	10°	20°	10°	10°	-10°	20°	10°
24 N	0°	10°	-5°	15°	10°	15°	10°	10°	-15°	15°	10°
23 N	-5°	15°	-10°	20°	15°	20°	15°	15°	-20°	20°	15°
22 N	-10°	20°	-15°	25°	20°	25°	20°	20°	-30°	30°	20°
21 N	-15°	25°	-20°	30°	25°	30°	25°	25°	-35°	35°	25°
20 N	-20°	30°	-25°	35°	30°	35°	30°	30°	-40°	40°	30°
19 N	-25°	35°	-30°	40°	35°	40°	35°	35°	-45°	45°	35°
18 N	-30°	40°	-35°	45°	40°	45°	40°	40°	-50°	50°	40°
17 N	-35°	45°	-40°	50°	45°	50°	45°	45°	-55°	55°	45°
16 N	-40°	50°	-45°	55°	50°	55°	50°	50°	-60°	60°	50°
15 N	-45°	55°	-50°	60°	55°	60°	55°	55°	-65°	65°	55°
14 N	-50°	60°	-55°	65°	60°	65°	60°	60°	-70°	70°	60°
13 N	-55°	65°	-60°	70°	65°	70°	65°	65°	-75°	75°	65°
12 N	-60°	70°	-65°	75°	70°	75°	70°	70°	-80°	80°	70°
11 N	-65°	75°	-70°	80°	75°	80°	75°	75°	-85°	85°	75°
10 N	-70°	80°	-75°	85°	80°	85°	80°	80°	-90°	90°	80°
9 N	-75°	85°	-80°	90°	85°	90°	85°	85°	-95°	95°	85°
8 N	-80°	90°	-85°	95°	90°	95°	90°	90°	-100°	100°	90°
7 N	-85°	95°	-90°	100°	95°	100°	95°	95°	-110°	110°	95°
6 N	-90°	100°	-95°	105°	100°	105°	100°	100°	-120°	120°	100°
5 N	-95°	105°	-100°	110°	105°	110°	105°	105°	-130°	130°	105°
4 N	-100°	110°	-105°	115°	110°	115°	110°	110°	-140°	140°	110°
3 N	-105°	115°	-110°	120°	115°	120°	115°	115°	-150°	150°	115°
2 N	-110°	120°	-115°	125°	120°	125°	120°	120°	-160°	160°	120°
1 N	-115°	125°	-120°	130°	125°	130°	125°	125°	-170°	170°	125°
0 N	-120°	130°	-125°	135°	130°	135°	130°	130°	-180°	180°	130°

SPRING-APR, MAY, JUN

二〇一

170 W

165 W

160 v

155 W

150 W

49 N

5	2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40																																																												
V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V																																																														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40																																																														
10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50																																																													
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60																																																												
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70																																																											
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80																																																										
68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110																																																											
108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150																																																											
139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180																																																												
178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230																																																	
228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280																																																	
278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340																																							
338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400																																							
399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500

49 N

45 N

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This atlas, and the series of which it is a part, is computer generated and automatically plotted. It makes available to the most recent surface current data collected and will be updated whenever sufficient amounts of data are added to the data file. This and the other atlases are based on a vast quantity of data as compared to the previous manually-compiled editions printed in the mid-thirties.		

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